**WHAT IS CLAIMED IS:**

1. A fluorescence spectrophotometer system including:
   (a) a light source;
   (b) a first double monochromator operating to separate and output selected wavelengths of light from the light source as excitation light;
   (c) a reflection light transfer module for directing substantially all of the excitation light directly onto a sample, and for collecting, focusing, and directing fluorescence light emitted from the sample as emission light;
   (d) a second double monochromator operating to separate and output selected wavelengths of the emission light; and
   (e) a photodetector and analyzer for detecting the selected wavelengths of emission light and outputting an indication of such detection.

2. The fluorescence spectrophotometer system of claim 1, wherein the first double monochromator or the second double monochromator includes:
   (a) an entrance slit for accepting light;
   (b) a first optical grating positioned to intercept and disperse the accepted light from the entrance slit;
   (c) a first selection slit positioned to intercept at least part of the dispersed light from the first optical grating and select and pass a narrowed range of wavelengths from such dispersed light;
   (d) a second optical grating positioned to intercept and disperse the passed light from the first selection slit; and
   (e) a second selection slit positioned to intercept at least part of the dispersed light from the second optical grating and select and pass a narrowed range of wavelengths from such dispersed light.

3. The fluorescence spectrophotometer system of claim 2, wherein the first optical grating and the second optical grating are both concave gratings.

4. The fluorescence spectrophotometer system of claim 3, wherein the concave gratings are holographic concave gratings.

5. The fluorescence spectrophotometer system of claim 2, wherein the first optical grating and the second optical grating pivot about axes of rotation for selecting a desired range of wavelengths of light as a function of angle of rotation.

6. The fluorescence spectrophotometer system of claim 2, further including a band drive, coupled to each of the first optical grating and the second optical grating, for rotating the first optical grating and the second optical grating synchronously.

7. The fluorescence spectrophotometer system of claim 1, wherein the reflection light transfer module includes:

(a) an excitation mirror, positioned substantially coaxial with a well containing the sample, for directing excitation light to illuminate the sample; and

(b) an emission mirror, positioned substantially coaxial with the well containing the sample, for collecting, focusing, and directing fluorescence light emitted by the sample.

8. The fluorescence spectrophotometer system of claim 7, wherein the emission mirror is a spherical mirror.

9. The fluorescence spectrophotometer system of claim 7, wherein the excitation and emission mirrors are first-surface mirrors.

10. The fluorescence spectrophotometer system of claim 7, wherein the excitation mirror is positioned to direct excitation light into an opening of the well, and the emission mirror is positioned to collect fluorescence light emitted from the opening of the well.

11. The fluorescence spectrophotometer system of claim 7, wherein the well has a transparent bottom substrate, and the excitation mirror is positioned to direct excitation light into the well through the transparent bottom substrate, and the emission mirror is positioned to collect fluorescence light emitted from a top opening of the well.

12. The fluorescence spectrophotometer system of claim 11, wherein one or both of the light source and first double monochromator are moved to direct excitation light directly onto the excitation mirror.

13. The fluorescence spectrophotometer system of claim 11, wherein one or more light directing mirrors are positioned to direct excitation light from the first double monochromator to the excitation mirror.

14. The fluorescence spectrophotometer system of claim 1, wherein the photodetector and analyzer counts the number of photons of the detected selected wavelengths of emission light.

15. A double monochromator including:

(a) an entrance slit for accepting light;

(b) a first optical grating positioned to intercept and disperse the accepted light from the entrance slit;

(c) a first selection slit positioned to intercept at least part of the dispersed light from the first optical grating and select and pass a narrowed range of wavelengths from such dispersed light;

(d) a second optical grating positioned to intercept and disperse the passed light from the first selection slit; and

(e) a second selection slit positioned to intercept at least part of the dispersed light from the second optical grating and select and pass a narrowed range of wavelengths from such dispersed light.

16. The double monochromator of claim 15, wherein the first optical grating and the second optical grating are both concave gratings.

17. The double monochromator of claim 16, wherein the concave gratings are holographic concave gratings.

18. The double monochromator of claim 15, wherein the first optical grating and the second optical grating pivot about axes of rotation for selecting a desired range of wavelengths of light as a function of angle of rotation.

19. The double monochromator of claim 15, further including a band drive, coupled to each of the first optical grating and the second optical grating, for rotating the first optical grating and the second optical grating synchronously.

20. A reflection light transfer module including:

(a) an input mirror, positioned substantially coaxial with an area to be illuminated, for directing incoming light to illuminate the area; and

(b) an output mirror, positioned substantially coaxial with the area to be illuminated and in reflective alignment with the input mirror, for collecting, focusing, and directing light emitted by the area upon illumination.

21. The reflection light transfer module of claim 20, wherein the emission mirror is a spherical mirror.

22. The reflection light transfer module of claim 20, wherein the excitation and emission mirrors are first-surface mirrors.